ABSTRACT

Charles University, Faculty of Pharmacy in Hradec Králové

Department of: Pharmaceutical Technology

Consultant: PharmDr. Petra Svačinová, Ph.D.

Student: Jana Slezáčková

Title of Thesis: The effect of the drying temperature on the properties of spray-dried lactose

The aim of this work was to investigate the effect of inlet temperature on the physicochemical properties of spray dried lactose.

10% lactose solution was prepared by dissolving D-lactose monohydrate in distilled water and subsequently dried in a laboratory-scale spray drier. The inlet temperature of 130 °C – 200 °C was used. The physicochemical properties of lactose particles was investigated by optical microscopy and differential scanning calorimetry.

Results indicated the influence of inlet temperature on particle size and shape and thermal properties of dried material. The morphology of spray-dried lactose showed tendency to higher sphericity when higher temperatures in a spray-drying process were used. Most of particles was in range 2,5 – 7,5 μm. The particles larger than 20 μm wasn´t observed at the inlet temperature of 150 – 200 °C. At the inlet temperature over 150 °C the glass transition temperature was noticed. The glass transition temperature was observed around 24,8 – 63,5 °C. It was evident that higher drying temperature increased the glass transition temperature. It has been found that the melting temperature of α-lactose wasn´t significantly affected by the drying temperature until the inlet temperature 180 °C, where the melting temperature increased. The enthalpy of α-lactose was around 132,8 – 238,8 J/g. The enthalpy wasn´t substantially influenced by the inlet temperature.

In conclusion, spray drying is a suitable method for the spherical and amorphous lactose particles preparation and by the control of the inlet temperature

we can influence the geometric properties of the particles. The temperature also affects the thermal characteristics of the dried material.